REMARKS

The Applicant thanks the Examiner for the careful consideration of this application. The Office Action dated February 11, 2009 has been received and its contents carefully considered. Claims 1-55, 58, 60, and 62-65 are currently pending in this application. Claim 61 has been canceled without prejudice to the subject matter disclosed therein. Claims 58 and 60 have been amended. Support for the amendments to claims 58 and 60 are found in the original claims, since hydrogen is required for the hydroformylation reaction. Applicants note that the recitation of "hydrogen" is intended to cover the addition of any hydrogen source to the reaction medium. Based on the foregoing amendments and the following remarks, the Applicant respectfully requests that the Examiner reconsider all outstanding rejections and that they be withdrawn.

Claim Rejection - 35 U.S.C. §103(a)

In the Office Action on page 2, the Examiner rejects claims 58 and 60 under 35 U.S.C. §103(a) as allegedly being unpatentable over Iverson et al. (Organometallics, 2001). The Examiner asserts that the reference teaches a catalyst complex comprising rhodium chloride and a bidentate ligand, and a reaction medium comprising the catalyst and a solvent. The Examiner further states that the reference does not disclose hydroformylation. The Examiner states that the hydroformylation catalyst and hydroformylation reaction system are not given patentable weight because they are in the preamble of the claim. Therefore, the claims have been amended to require a hydrogen source with the catalyst system and reaction medium, since hydrogen is required for a hydroformylation reaction. Since Iverson et al. does not teach hydroformylation, one of ordinary skill would have no reason to modify the teaching of Iverson et al. to include a hydrogen source. The Applicants therefore respectfully request the rejection be withdrawn.

In the Office action on page 3, the Examiner rejects claim 58 under 35 U.S.C. §103(a) as allegedly being unpatentable over Hofmann et al. (Journal of Organometallic Chemistry, 1995). The Examiner asserts that the reference teaches bis(di-tbutylphosphino) methane complexes of rhodium for use in an alkyne hydrosilation reaction. The examiner further states that Hoffmann et al. does not teach hydroformylation reactions. The Examiner states that the term "hydroformylation catalyst" is not given patentable weight because it is in the preamble of the claim. Therefore, the claims have been amended

to require a hydrogen source with the catalyst system, since hydrogen is required for a hydroformylation reaction. Since Hoffmann et al. does not teach hydroformylation, one of ordinary skill would have no reason to modify the teaching of Iverson et al. to include a hydrogen source. The Applicants therefore respectfully request the rejection be withdrawn.

In the Office Action on page 4, the Examiner rejects claims 1, 2, 4-41 44-47, 51-55, and 60-65 under 35 U.S.C. §103(a) as allegedly being unpatentable over Breikss et al. (US 5,710,344) and Eastham et al. (US 6,335,471) in combination. The Examiner asserts that Breikss et al. teach a process for preparing linear aldehydes by the hydroformylation of an ethylenically unsaturated organic compound in the presence of a catalyst comprising a group VIII metal and a bidentate phosphorus ligand, but that Breikss et al. does not teach the ligand required by the claims. The Examiner further asserts that Eastham et al. teach bidentate phosphine ligands that encompasses the ligands of the claims, useful as a component of a catalyst system in the carbonylation of olefins. The Examiner concludes that it would have been obvious to one of ordinary skill in the art "to include the bidentate ligands taught by Eastham et al. as possible alternatives to the bidentate ligands taught by Breikss et al. in order **to experiment** and find the best metal-ligand combination that affords optimum selectivity to linear aldehydes in the process taught by Breikss et al." (emphasis added)

First, the ligands described by Eastham et al. have a central connecting group L^1-X-L^2, where L^1 and L^2 are optionally substituted lower alkylene chain, and X is an optionally substituted aryl moiety. Therefore, Eastham et al. does not teach ligands according to the present invention where R is an alkylene group. This feature is required by claims 55 and 63. For at least this reason, the rejection of claims 55 and 63 in view of Breikss et al. and Eastham et al. should be withdrawn.

Claims 1 and 2 are independent claims, and claim a process for hydroformylation of ethylenically unsaturated compounds by reacting said ethylenically unsaturated compound with carbon monoxide and hydrogen in the presence of a catalyst system. The catalyst system is derived from a group VIII metal compound and a bidentate ligand. In claim 1, a chlorine moiety is present in at least the group VIII metal compound. Claim 2 further requires a solvent, and a chlorine moiety present in at least one of the group VIII metal compound or the solvent.

The MPEP 2143(E) discusses the standard of "obvious to try" or as used by the Examiner, "to experiment."

> To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Then, Office personnel must articulate the following:
> (1)a finding that at the time of the invention, there had been a recognized problem or need in the art, which may include a design need or market pressure to solve a problem;
> (2)a finding that there had been a finite number of identified, predictable potential solutions to the recognized need or problem;
> (3)a finding that one of ordinary skill in the art could have pursued the known potential solutions with a reasonable expectation of success; and
> (4)whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

In the instant case, the Examiner has not identified a design need or market pressure. However, no disadvantage or pressure which would motivate one of ordinary skill in the art to modify Breikss et al. and seek other ligands has been shown. Second, the Examiner has not shown that the ligands described by Eastham et al. are one of a finite number of identified, **predictable** potential solutions. In this case, the ligands described by Eastham et al. are one of a multitude potential ligands, any of which "may" be functional in a hydroformylation reaction as described by Breikss et al. There is no teaching in Eastham et al. that the ligands are used for hydroformylation reactions, only that they may be useful in carbonylation reactions in general. Therefore, according to the Examiner assertion, the number of "potential solutions" include **any** phosphine ligand usable in carbonylation reactions. The total number of potential solutions is therefore essentially infinite, not defined, and not a finite set. Furthermore, there is very low predictability in the field of organic chemistry, and even lower predictability in the field of catalysis. Therefore, absent a teaching of the ligands used in hydroformylation reactions, there is no reason for one of ordinary skill to use the ligands described by Eastham et al. in the process described by Breikss et al., and no reasonable expectation of success to do so. Therefore, the substitution of the ligands described by Breikss et al. with the ligands described by Eastham et al. could only be achieved by hindsight reconstruction of the present invention. In light of this, the Applicants respectfully request the rejections be withdrawn.

Furthermore, the modifications required by the Examiner require that one of ordinary skill must not only substitute the ligands described by Eastham et al., which does not teach their use in hydroformylation reaction, for the ligands described by Breikss et al., but must also select particular ruthenium reagents and/or solvents from those described by Breikss et al. for use in the reaction. Breikss et al. generically discloses group VIII metal compounds, and expresses no preference for group VIII metal compounds having a chlorine atoms or the use of solvents containing chlorine atoms. The only rhodium compound used by Breikss et al. (Rh(CO)2DPM) has no chlorine atoms. The only solvent used is toluene. At best, Breikss et al. teach that all rhodium compounds and solvents are equivalent. As described in the specification, not all rhodium reagents produce the high linear selectivity in the hydroformylation reaction of the present invention, nor do all solvents produce the high linear selectivity of the present invention. Rhodium reagents having at least one chlorine atom showed high selectivity for linear products, compared with Rhodium reagents having no chlorine atoms, even when used with the same ligand, as shown in Example 1 and comparative Example 1. Similarly, solvents containing chlorine atoms showed increased linear selectivity compared with solvents not containing chlorine, even when the same rhodium compound is used, as shown in Example 3 and comparative Example 1. These results are unexpected in view of Breikss et al. Eastham et al. does not disclose the use of the ligands in hydroformylation reactions, nor the unexpected increase in linear product illustrated in the examples, and does not overcome the deficiencies of Breikss et al. In light of these unexpected results, the Applicants respectfully request the rejections be withdrawn.

Claims 4-41, 44-47, 51-55, and 60-65 depend directly or indirectly from independent claim 1 and are non-obvious over the cited references for at least the same reasons as claim 1. Reconsideration and withdrawal of the rejection is respectfully requested in view of the foregoing amendments and remarks.

Claim Objections

In the Office Action on page 5, the Examiner indicates that claims 3, 42-43, and 48-50 are objected to for being dependent upon a rejected base claim, but would be allowable if rewritten in

independent form including all of the limitations of the base claim and any intervening claims. The Applicants appreciate and acknowledge the Examiner's indication of allowable subject matter.

In the Office Action on page 5, the Examiner objects to claim 61 for failing to further limit the subject matter of a previous claim. In response, claim 61 has been canceled without prejudice to the subject matter disclosed therein. The Applicants therefore respectfully request the objection be withdrawn.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is hereby invited to telephone the undersigned at the number provided.

The Commissioner is authorized to charge any deficiency in any patent application processing fees pursuant to 37 CFR § 1.17, including extension of time fees pursuant to 37 CFR § 1.17(a)-(d), associated with this communication and to credit any excess payment to Deposit Account No. 22-0261.

Dated: May 5, 2009

Respectfully submitted,

By /Keith G. Haddaway/
Keith G. Haddaway, Ph.D.
Registration No.: 46,180
VENABLE LLP
P.O. Box 34385
Washington, DC 20043-9998
(202) 344-4000
(202) 344-8300 (Fax)
Attorney/Agent For Applicant